

# Drought Response: Current Hydrologic Conditions Model Results for Emergency Barriers in the Delta

March 19, 2014

Paul Helliker  
Deputy Director  
Delta and Statewide Water Management  
California Department of Water Resources



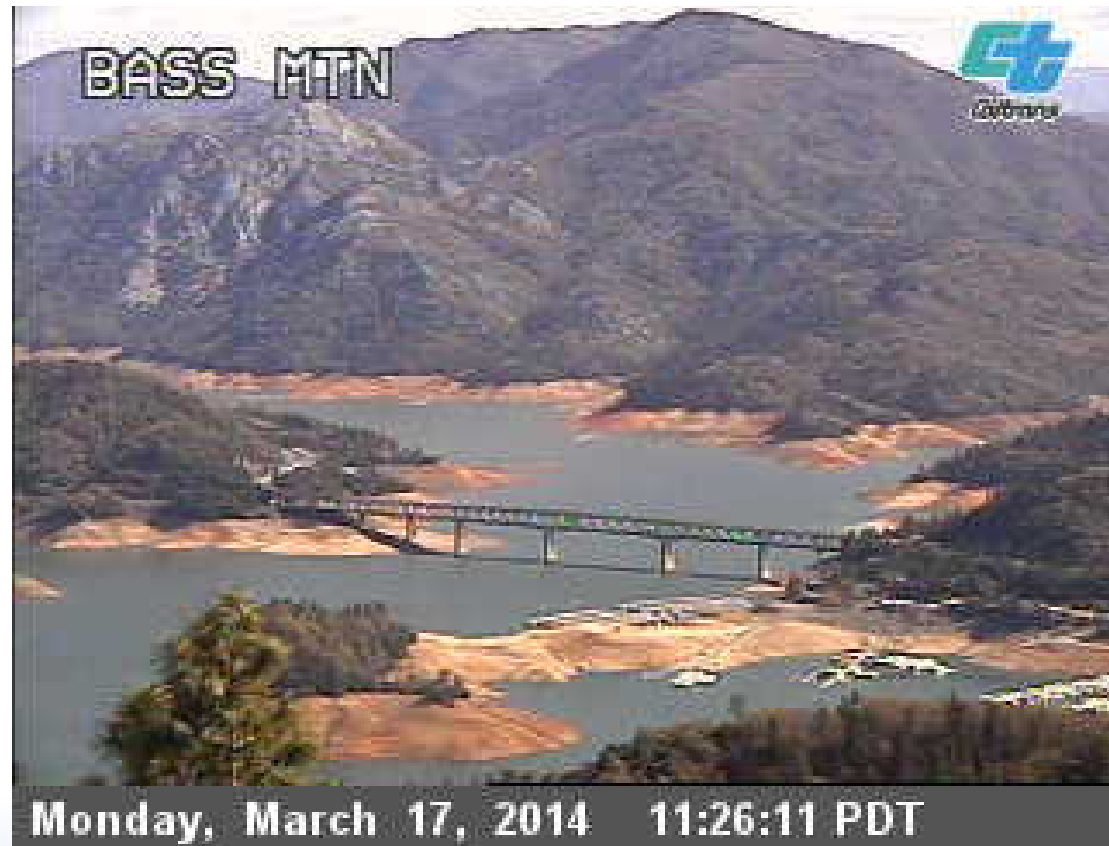
# Current Hydrologic Conditions



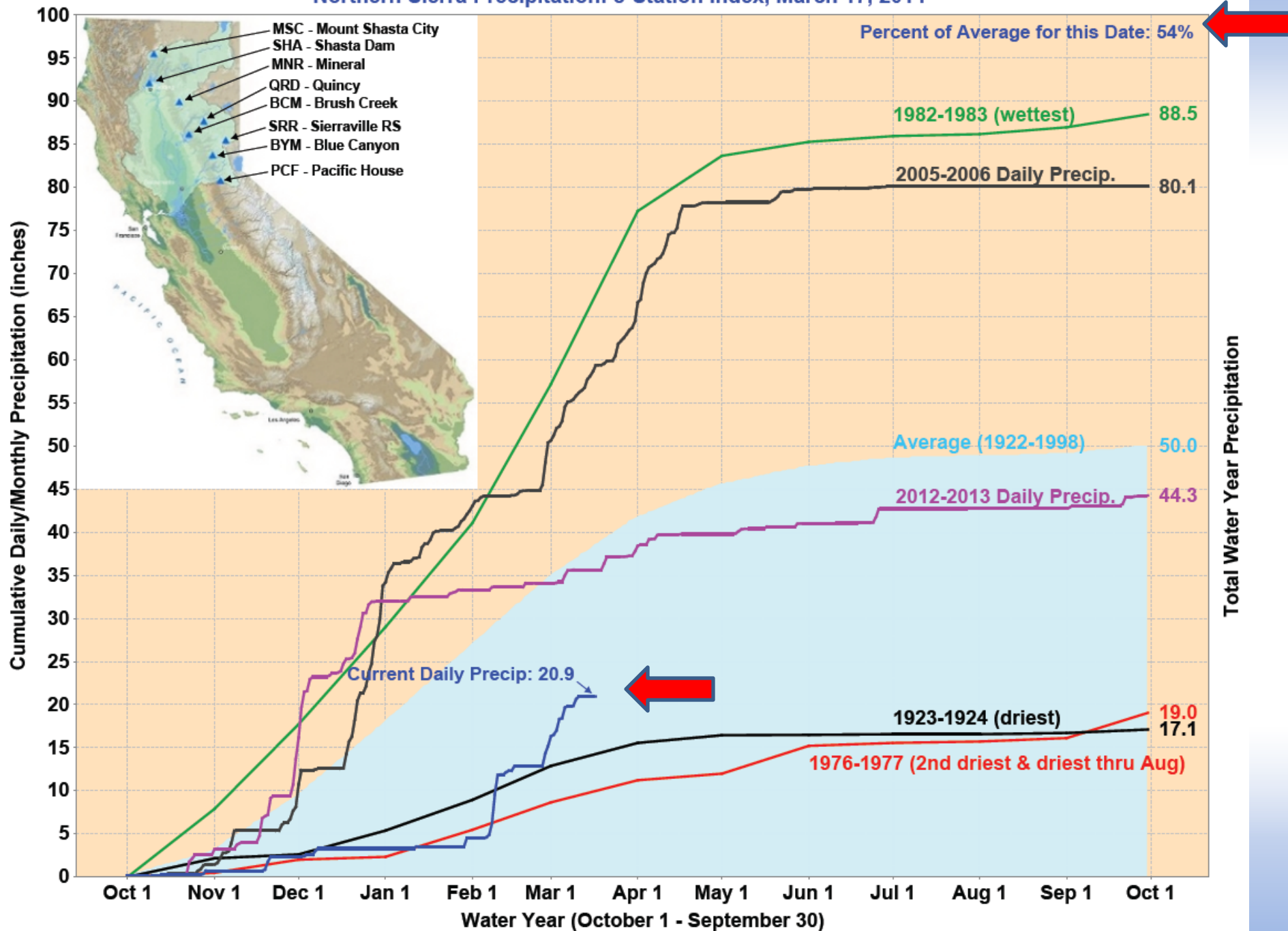
# Water Year 2014 to Date

Lake Shasta/I-5 Bridge

- Third dry year – 2013 driest on record
- Statewide unimpaired river runoff: 39% of average (Mar 11)
- Initial SWP allocation 5% (Nov); revised in January to 0%



# Northern Sierra Precipitation: 8-Station Index, March 17, 2014



# Snow Water Content

March 17, 2014

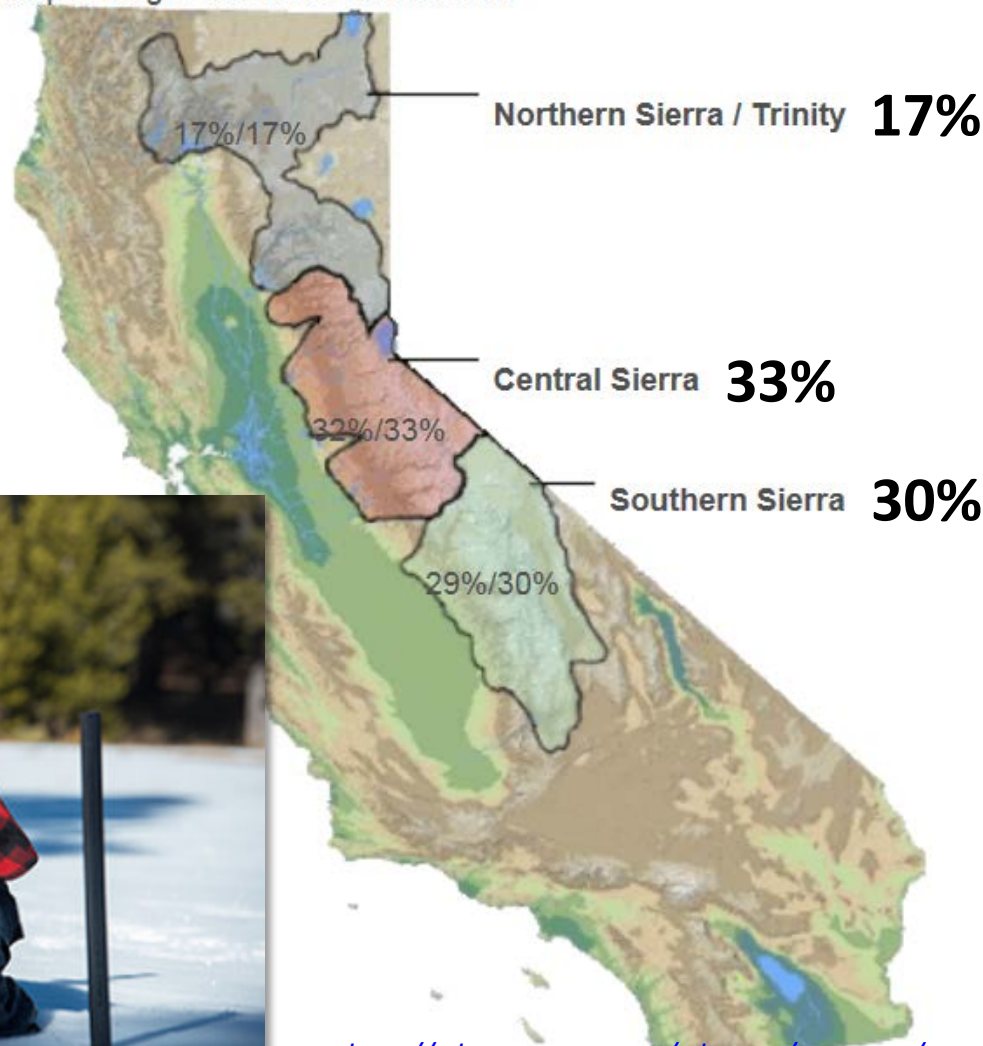
Statewide  
Average: 27%



## Statewide Summary of Snow Water Content

Data For: 17-Mar-2014

% Apr 1 Avg. / % Normal for this Date



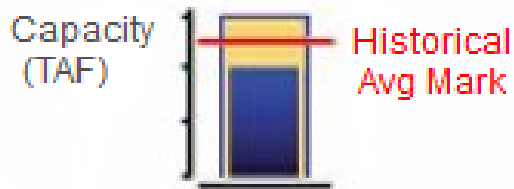


# CA Reservoir Storage

March 16, 2014

## LEGEND

**Blue Bar:** Storage level for date  
**Gold Bar:** Total reservoir capacity.  
**Red Line:** Historic level for date.



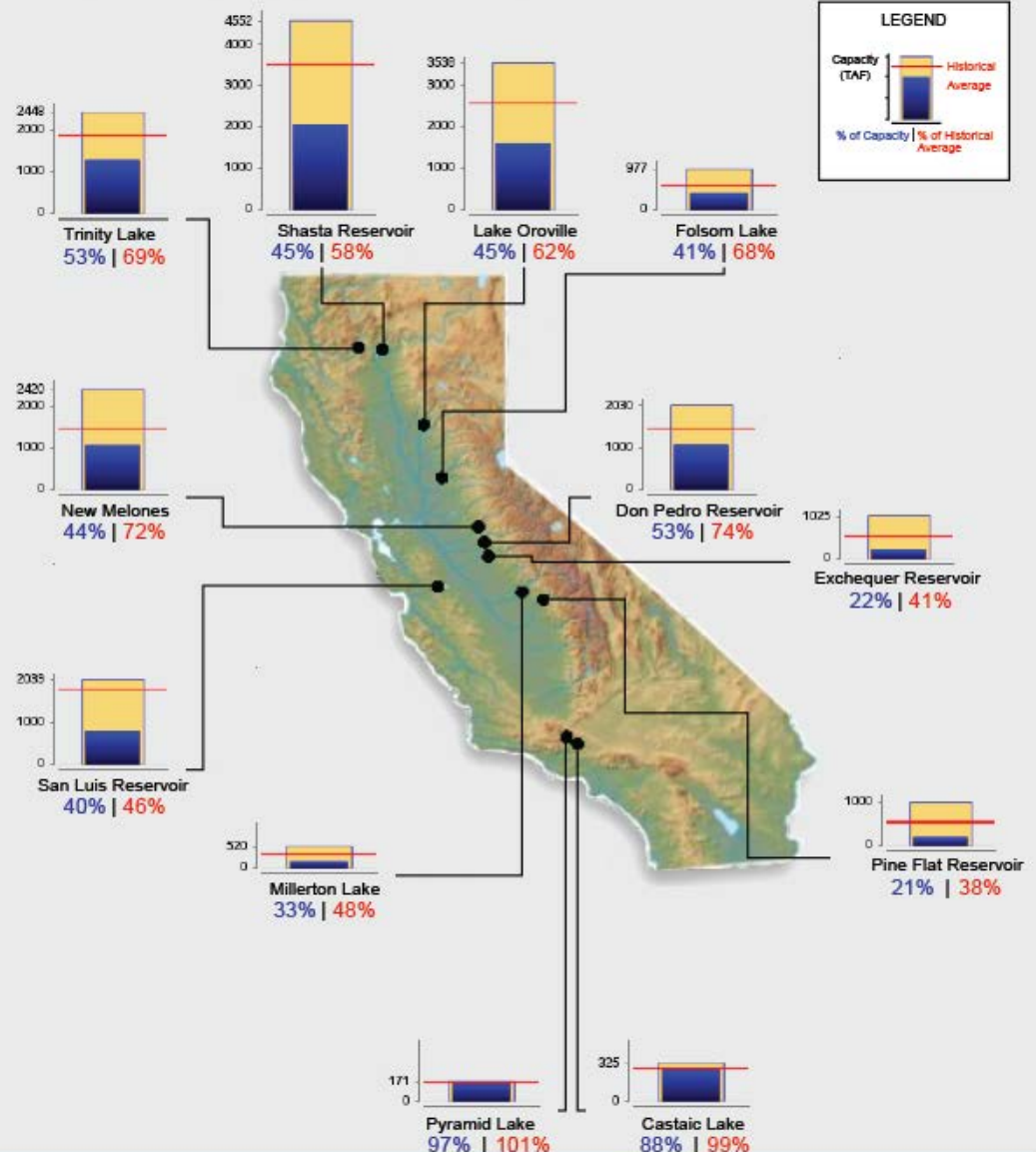
**% of Capacity | % Historical Avg**  
 (Click reservoir name for details)



# Reservoir Conditions

Ending At Midnight - March 16, 2014

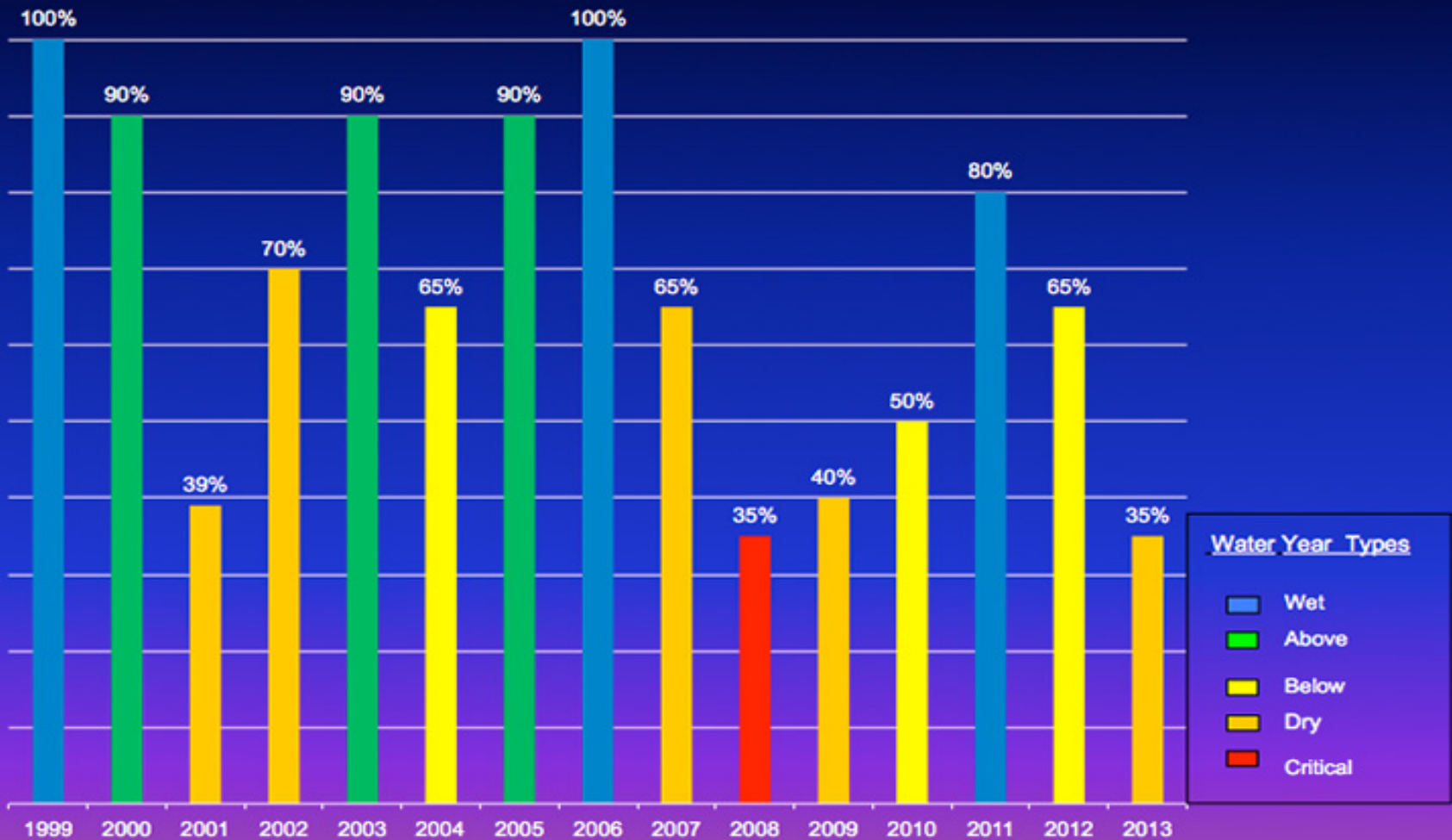
## CURRENT RESERVOIR CONDITIONS



Graph Updated 03/17/2014 10:45 AM

# Impacts of Consecutive Dry Years: Lower Allocations, Declining Groundwater Levels

**SWP Allocation by Year Type**



# **Emergency Drought Barriers in 1977 and 2009 Drought Barriers Study**





# Historic Saltwater Intrusion

Taken from 1978 report

Multiple incidents

Intrusion makes water:

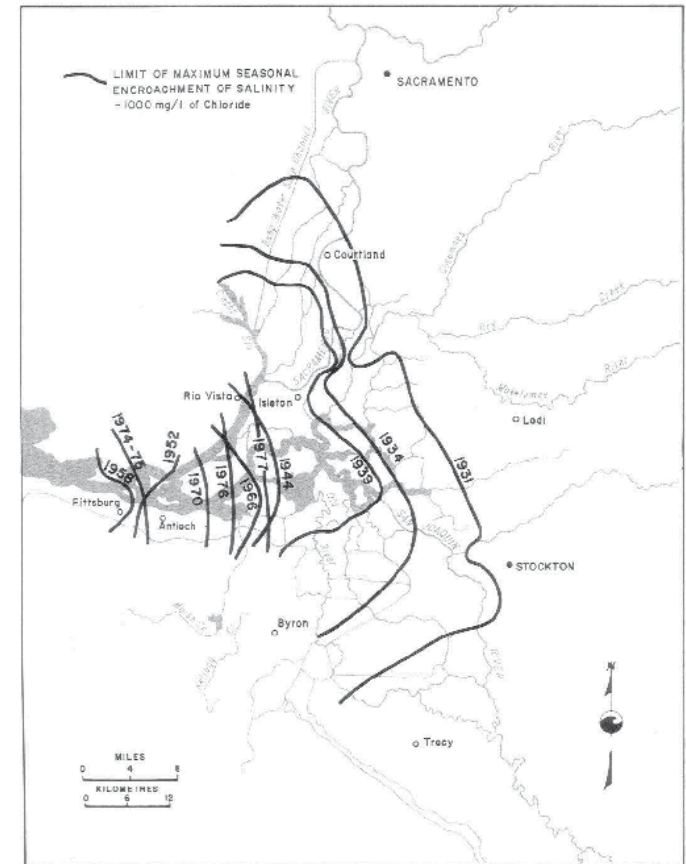
unsuitable for drinking

unsuitable for irrigation

unsuitable for in-Delta uses

unsuitable for other purposes

Figure 16.  
SALT-WATER INTRUSION IN THE SACRAMENTO-SAN JOAQUIN DELTA



32



# 1977 Emergency Barriers

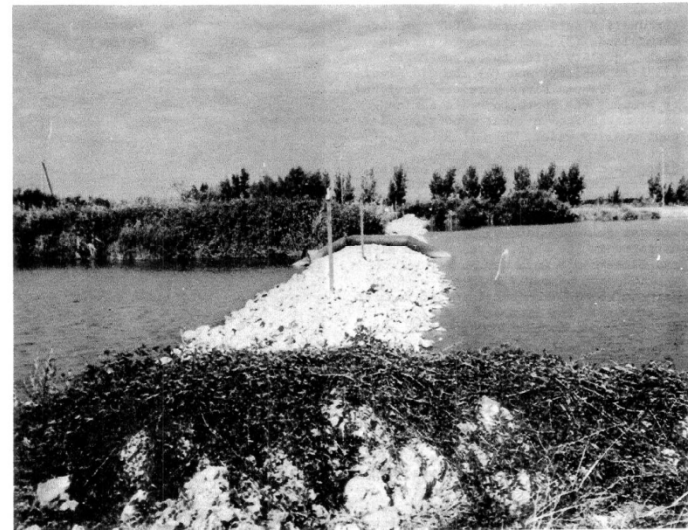
- 37 years ago
- California's population was 22 million then.
- In 2014, the population is 38 million.
- The '76-77 barriers helped protect many Delta water users including:
  - Delta farmers
  - City of Antioch
  - City of Tracy
  - Contra Costa Water District



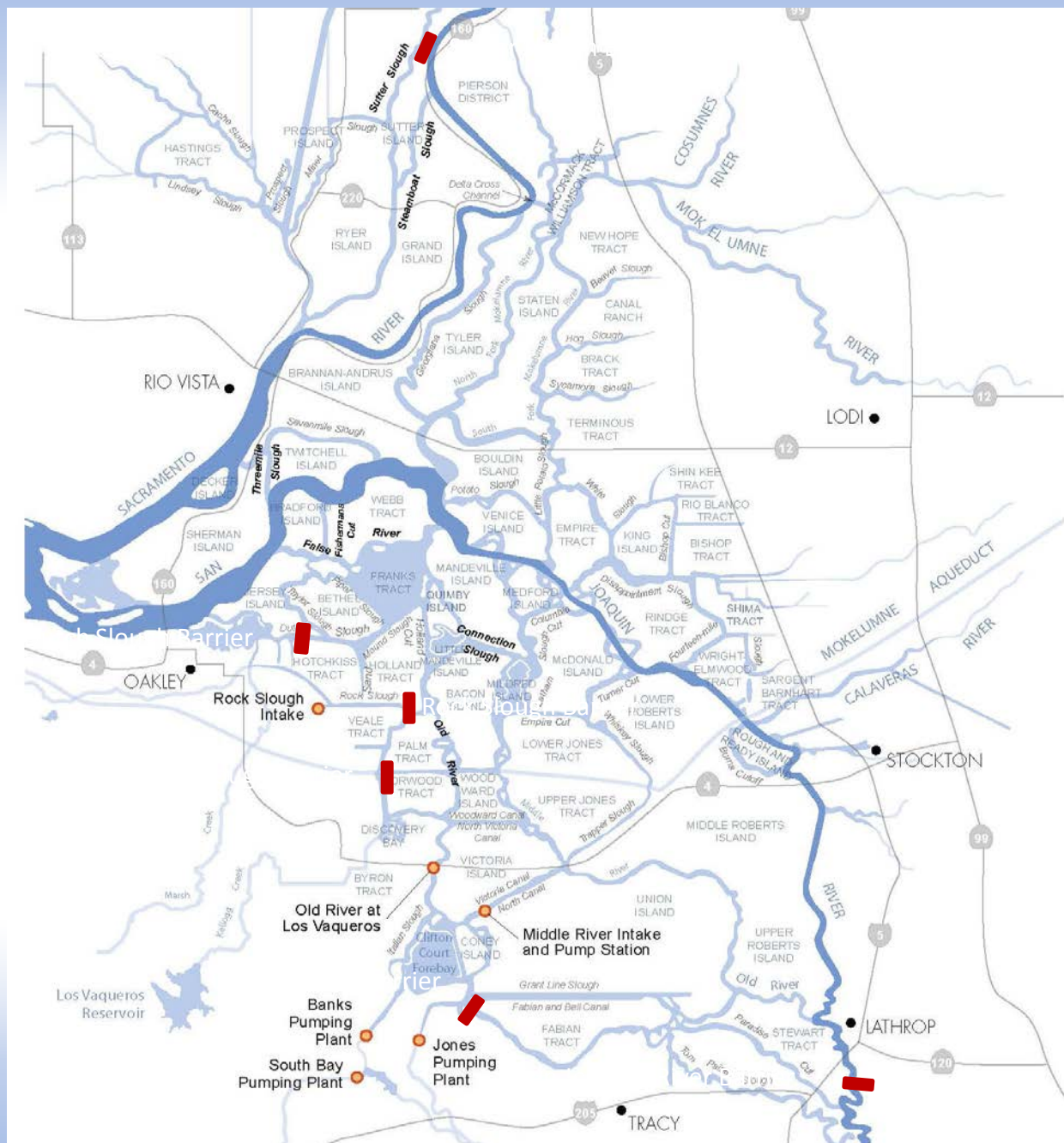
dards even though the modification had as one of its purposes the protection of the Delta against future loss of salinity control because of insufficient upstream storage. Before that suit could be tried, it was necessary for the SWRCB to hold an emergency hearing to deal with the fact that actual hydrologic conditions were very much worse than had been projected. Even under the Interim Plan's modified criteria, Lake Oroville no longer would be able to generate electricity by late summer and would end 1977 only 14 percent filled -- an insufficient amount of storage to protect the Delta if the drought continued into

1978.

In early June 1977, the SWRCB issued an emergency regulation which superseded the Interim Delta Quality Control Plan by temporarily eliminating most water quality standards and limiting SWP exports to unstored water. The regulation was necessary to preserve Oroville storage levels to the greatest extent possible. This emergency regulation was to have terminated no later than December 31, 1977, but with some modifications was extended in mid-December because of continued low reservoir levels.



4. Dams in the Delta. Two barriers, one at Rock Slough (shown) and the other at Indian Slough, actually saved water during the drought. By redirecting fresher water to the Contra Costa Canal Intake, less water had to be released from upstream reservoirs to maintain the same level of water quality.



Barriers installed in 1977-78 Drought



# Drought Barriers 2009

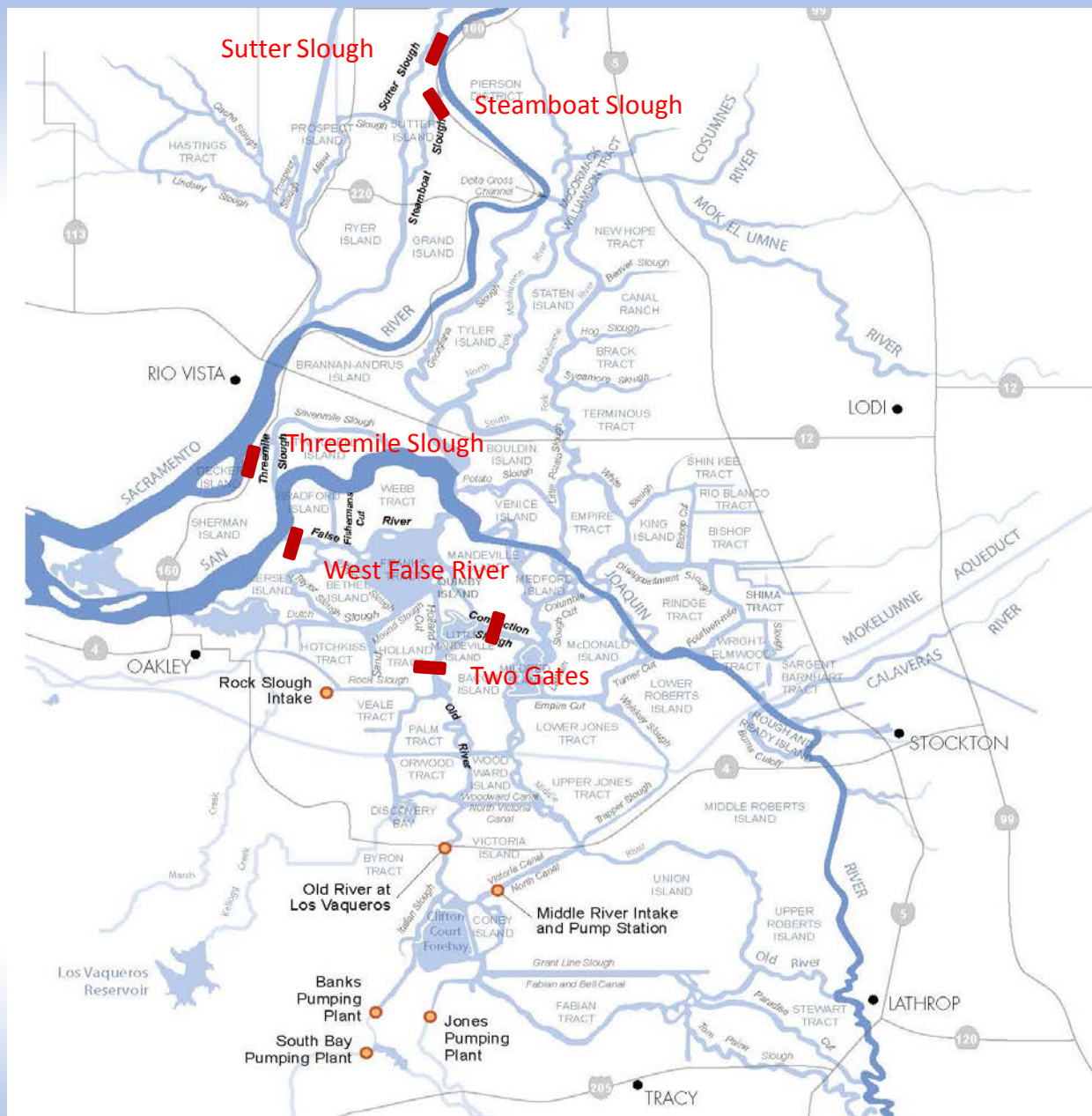
State of California  
The Resources Agency  
**Department of Water Resources**  
Bay-Delta Office

Administrative Draft  
April 2009

**Delta Drought  
Emergency Barriers**







Barriers locations in 2009 DWR Drought Emergency Barriers  
Draft Report



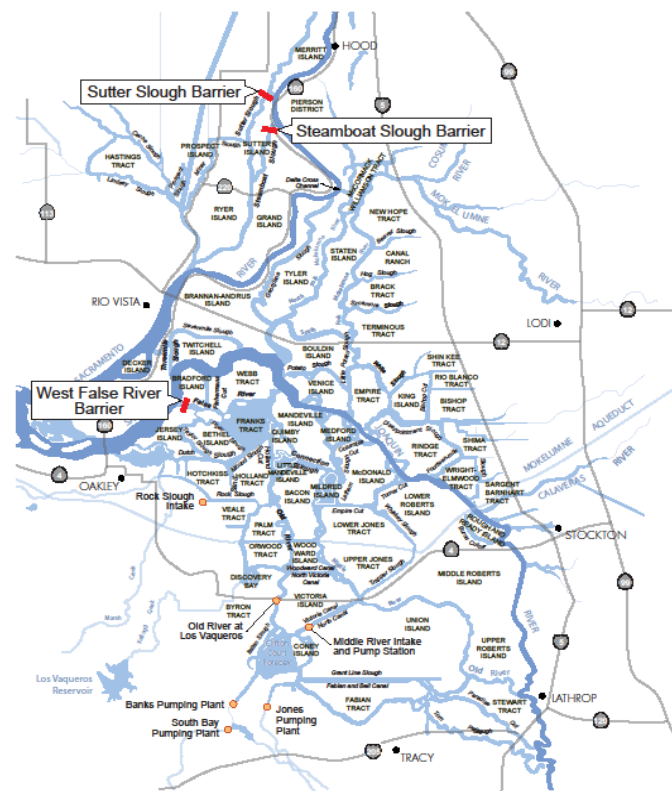
# **Proposed Temporary Emergency Barriers for 2014**

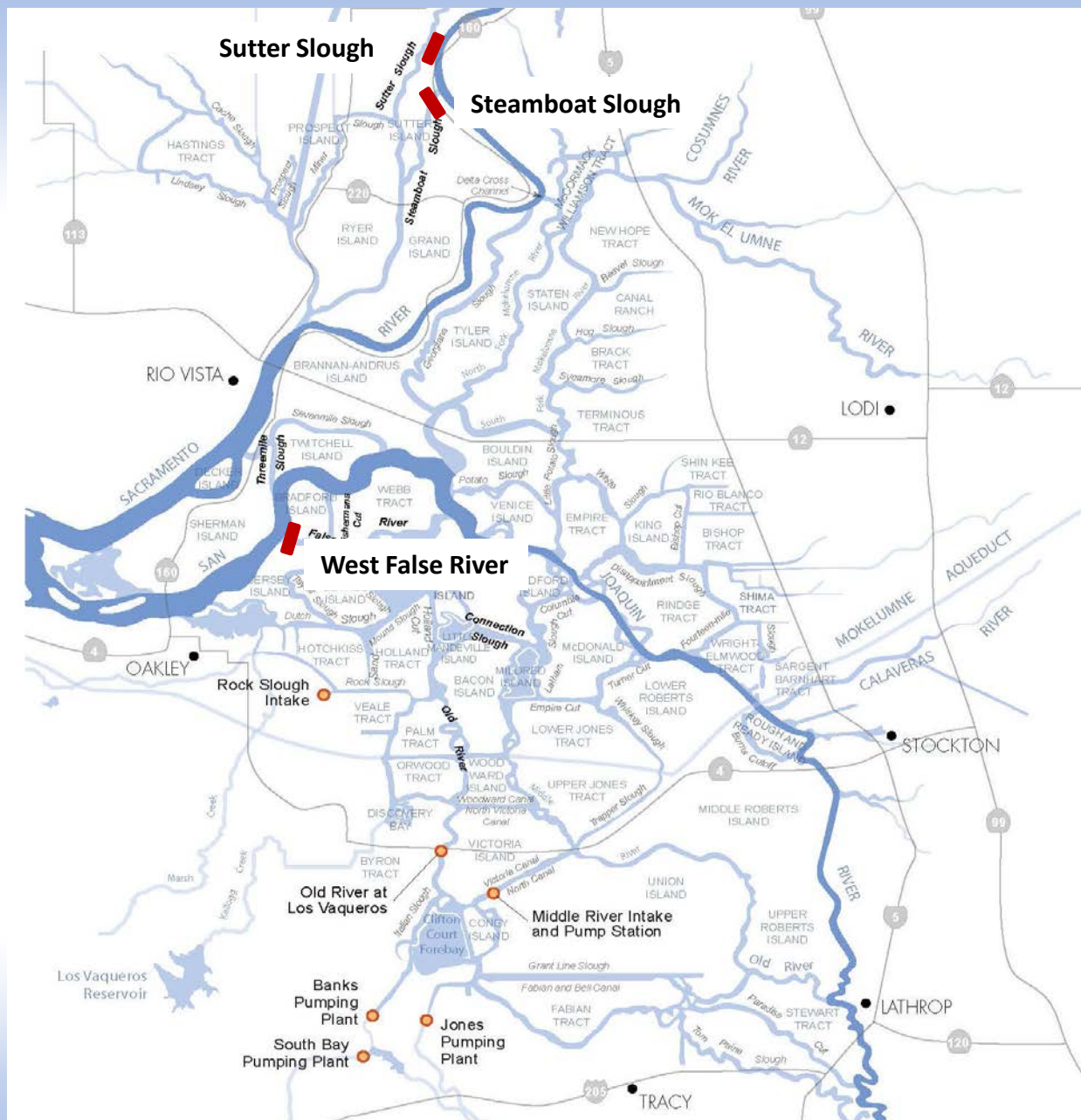




# Locations of 2014 Potential Emergency Drought Barriers

- Temporary rock barriers
- Permits required
- Agency consultations
- Goals:
  - Prevent saltwater intrusion
  - Allow water managers to retain some water in upstream reservoirs for release later in the year



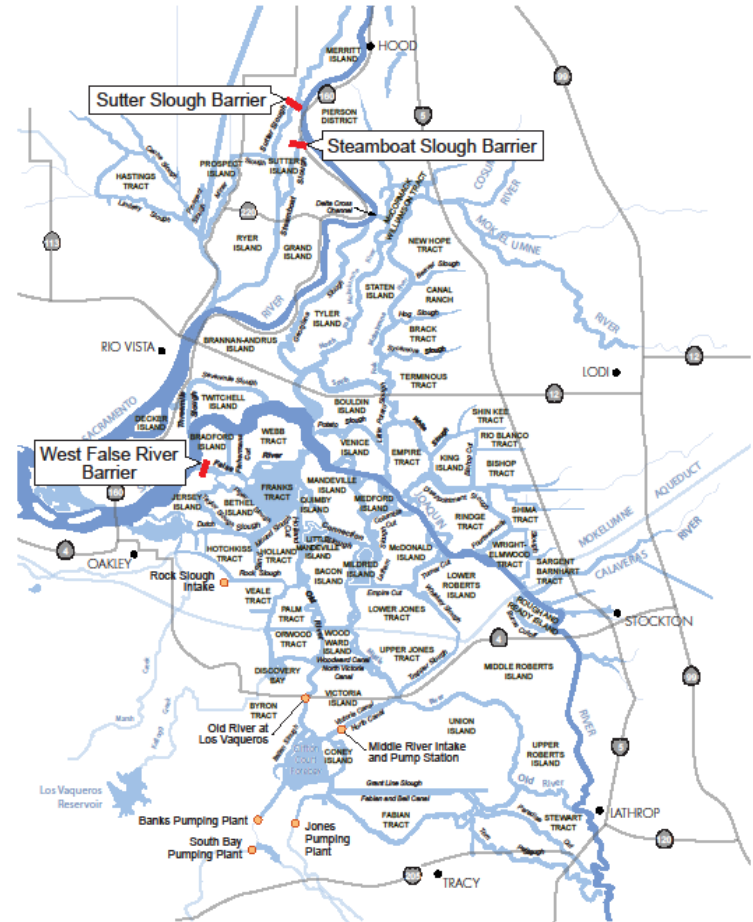


Sutter/Steamboat Sloughs and West False River Alternative

# Benefits of Proposed Locations

**Sutter Slough and Steamboat Slough will redirect upstream flows to better repel saltwater intrusion into the Delta.**

**West False River will prevent saltwater intrusion into Frank's Tract and thus protect more of the Central and South Delta.**

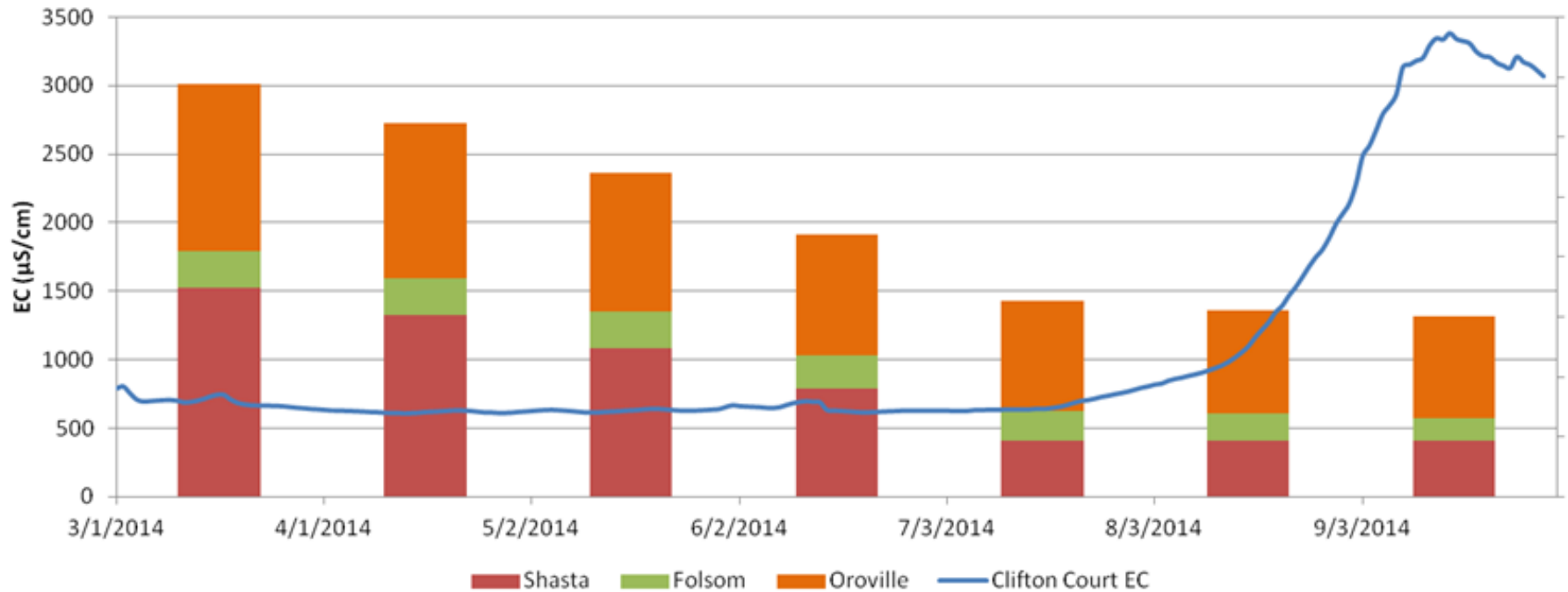


# Water Quality Modeling Results



# No Barriers / Meet Delta WQ

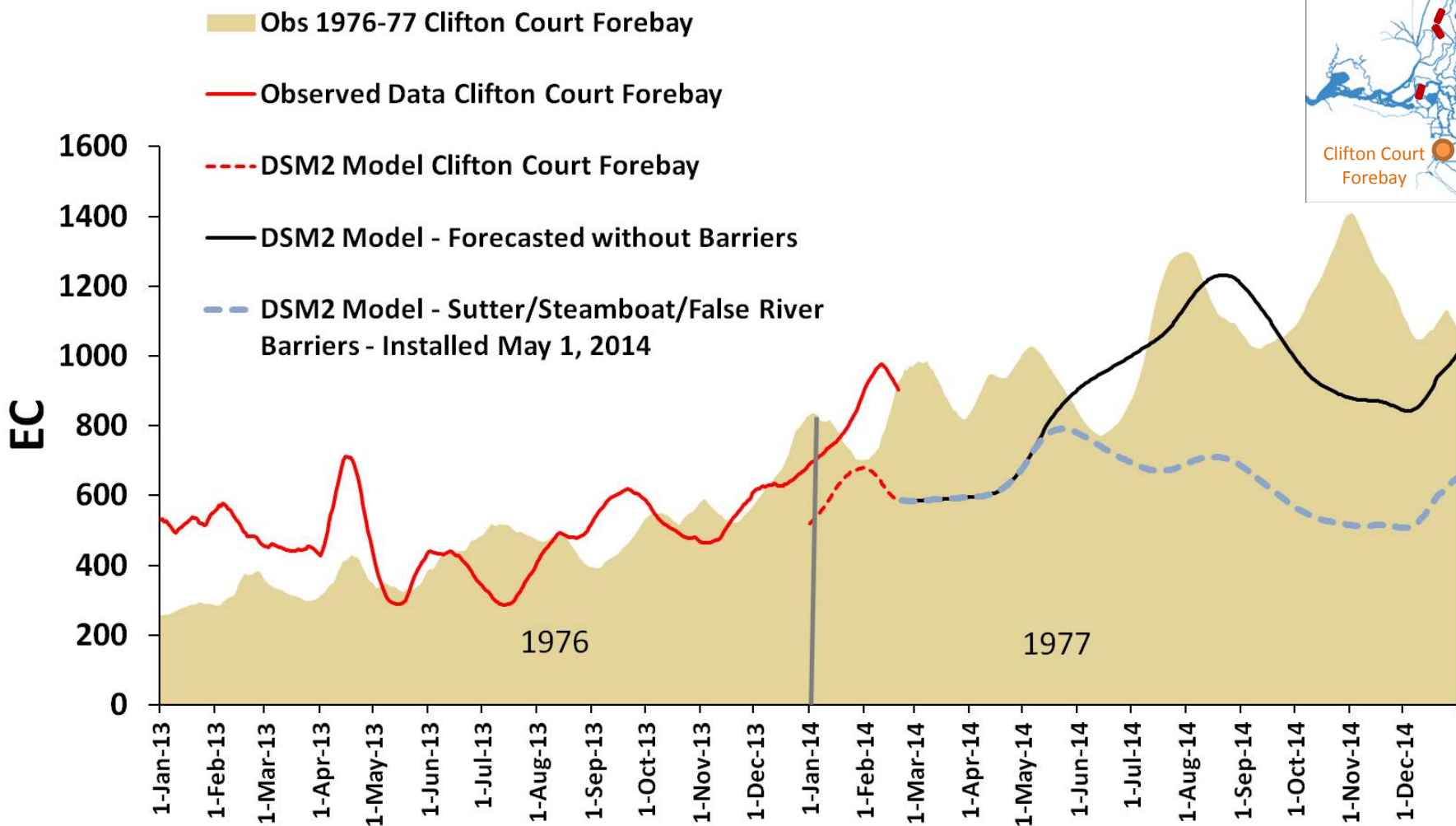
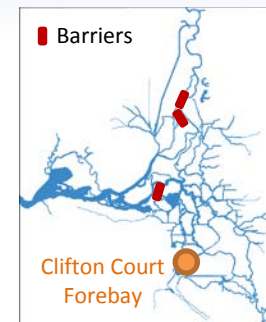
Modeled Clifton Court EC with End of Month Reservoir Storage  
Run 3 Power Pool



# Comparison of Observed Data and Forecast with 1976 -1977

## Observed Salinity (EC)

### Barrier Installation – May 1, 2014

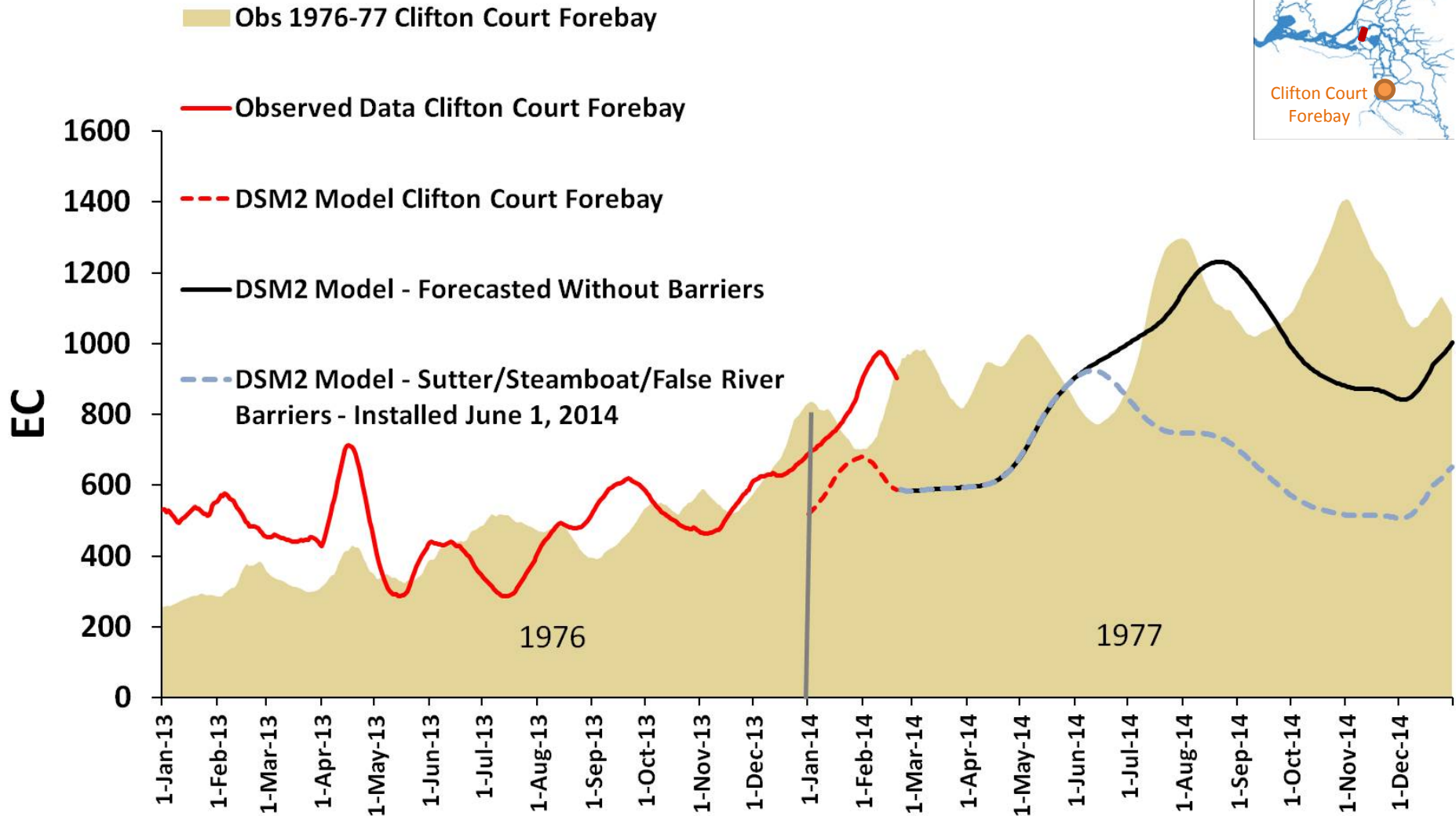




# Comparison of Observed Data and Forecast with 1976 -1977

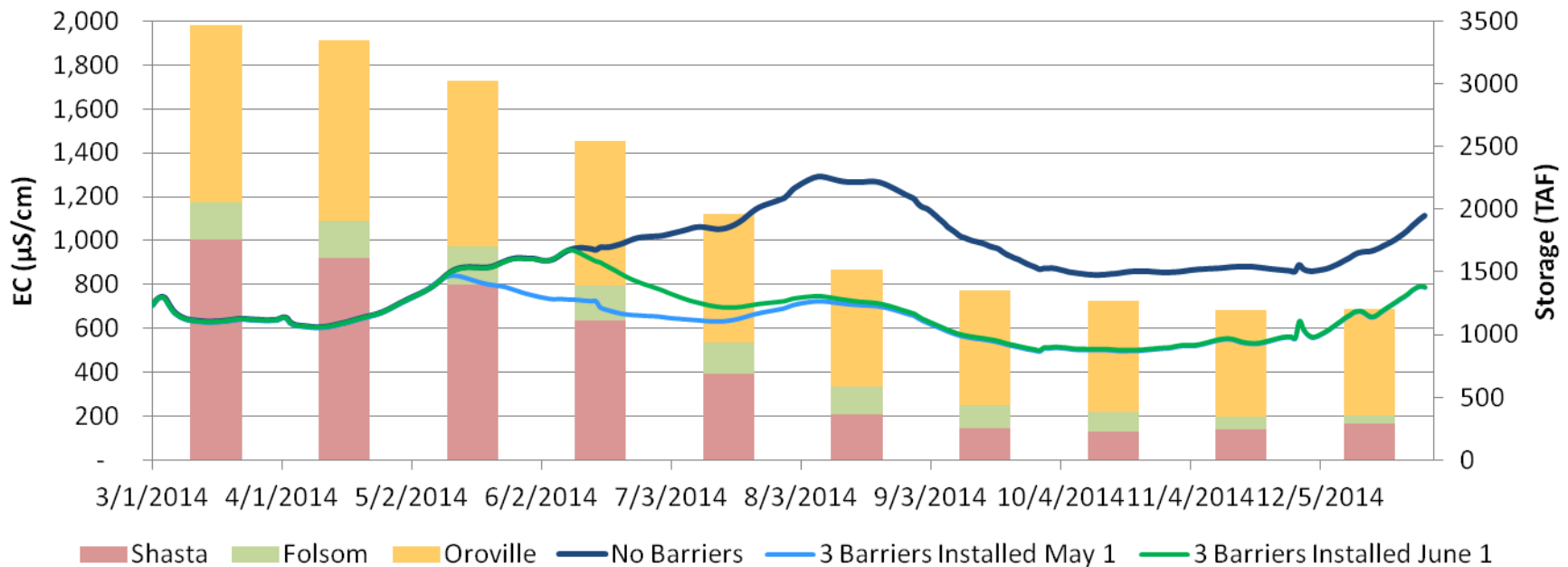
## Observed Salinity (EC)

### Barrier Installation – June 1, 2014



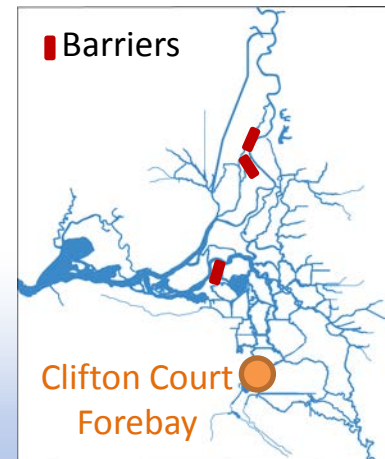
## Modeled Clifton Court Salinity with End of Month Reservoir Storage

### Minimum Releases from Allocation Study with Delta Cross Channel Open in May and June



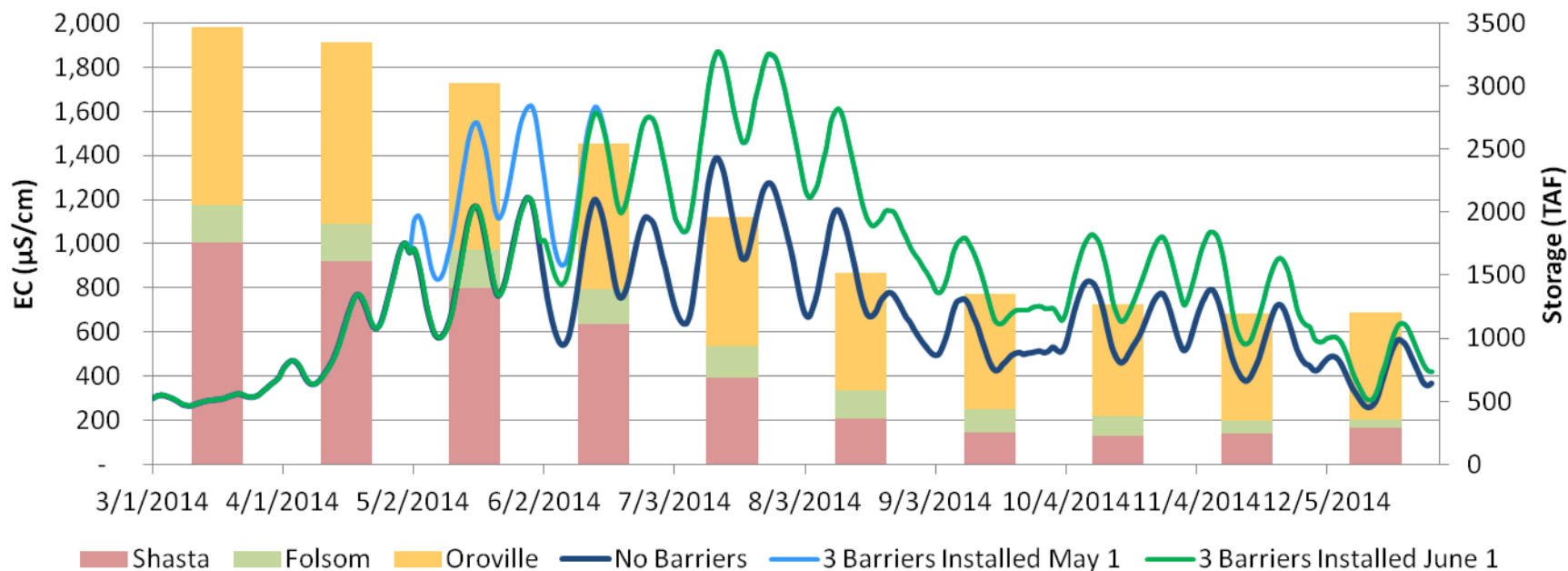
- Feb 20, 2014 forecast
- Feb 20 Reservoir Conditions
 

– Shasta 1720 TAF 38% capacity	Mar 16 Reservoir Conditions
– Folsom 290 TAF 29% capacity	– Shasta 2050 TAF 45% capacity
– Oroville 1385 TAF 39% capacity	– Folsom 400 TAF 41% capacity
	– Oroville 1600 TAF 45% capacity
- Total Reservoir Capacity ~9,000 TAF



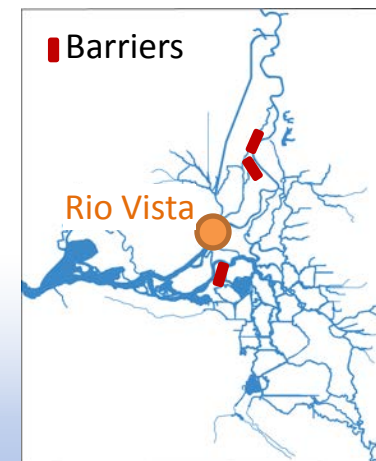
## Modeled Rio Vista Salinity with End of Month Reservoir Storage

### Minimum Releases from Allocation Study with Delta Cross Channel Open in May and June

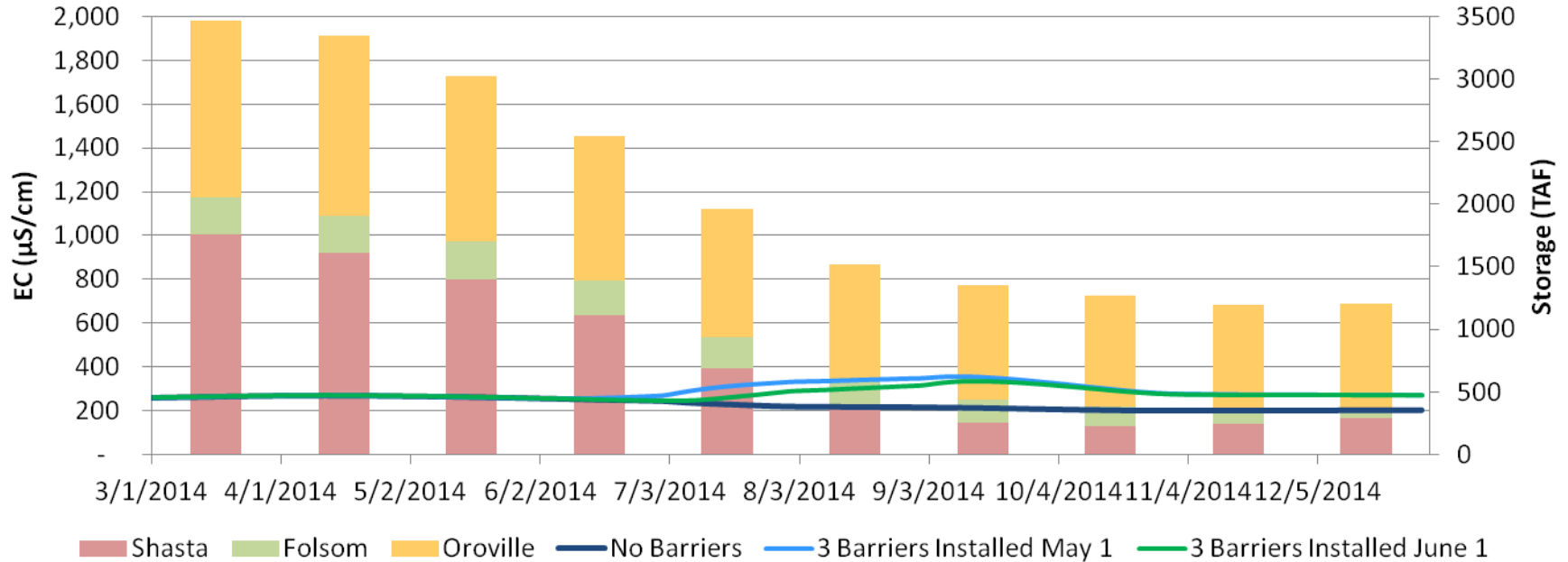


- Feb 20, 2014 forecast
- Feb 20 Reservoir Conditions
 

– Shasta 1720 TAF 38% capacity	Mar 16 Reservoir Conditions
– Folsom 290 TAF 29% capacity	– Shasta 2050 TAF 45% capacity
– Oroville 1385 TAF 39% capacity	– Folsom 400 TAF 41% capacity
	– Oroville 1600 TAF 45% capacity
- Total Reservoir Capacity ~9,000 TAF



# Modeled Barker Slough Salinity with End of Month Reservoir Storage Minimum Releases from Allocation Study with Delta Cross Channel Open in May and June



- Feb 20, 2014 forecast

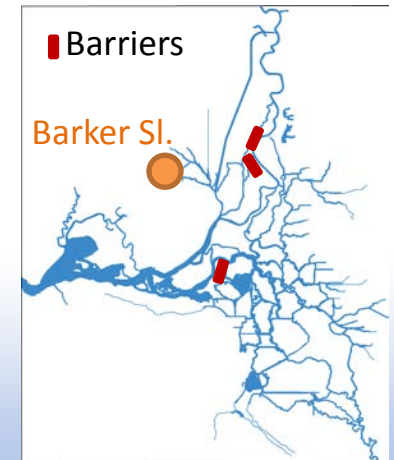
- Feb 20 Reservoir Conditions

- Shasta 1720 TAF 38% capacity
- Folsom 290 TAF 29% capacity
- Oroville 1385 TAF 39% capacity

- Mar 16 Reservoir Conditions

- Shasta 2050 TAF 45% capacity
- Folsom 400 TAF 41% capacity
- Oroville 1600 TAF 45% capacity

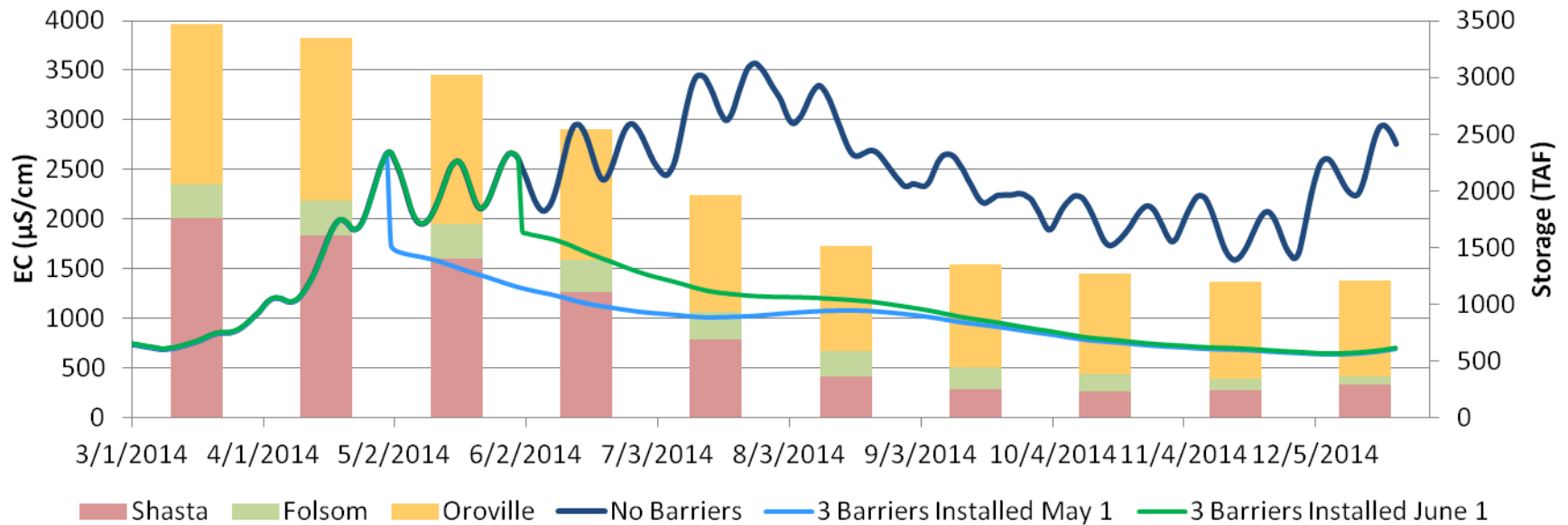
- Total Reservoir Capacity ~9,000 TAF



# Modeled Salinity Downstream of False River Barrier

with End of Month Reservoir Storage

Minimum Releases from Allocation Study with Delta Cross Channel Open in May and June



- Feb 20, 2014 forecast

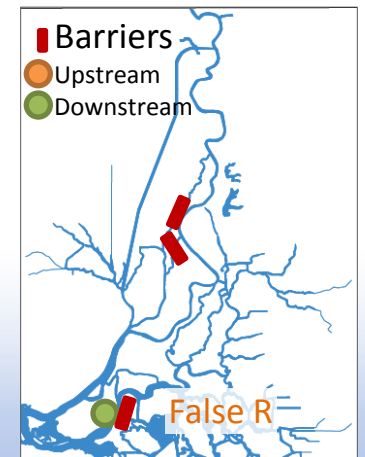
- Feb 20 Reservoir Conditions

- Shasta 1720 TAF 38% capacity
- Folsom 290 TAF 29% capacity
- Oroville 1385 TAF 39% capacity

- Mar 16 Reservoir Conditions

- Shasta 2050 TAF 45% capacity
- Folsom 400 TAF 41% capacity
- Oroville 1600 TAF 45% capacity

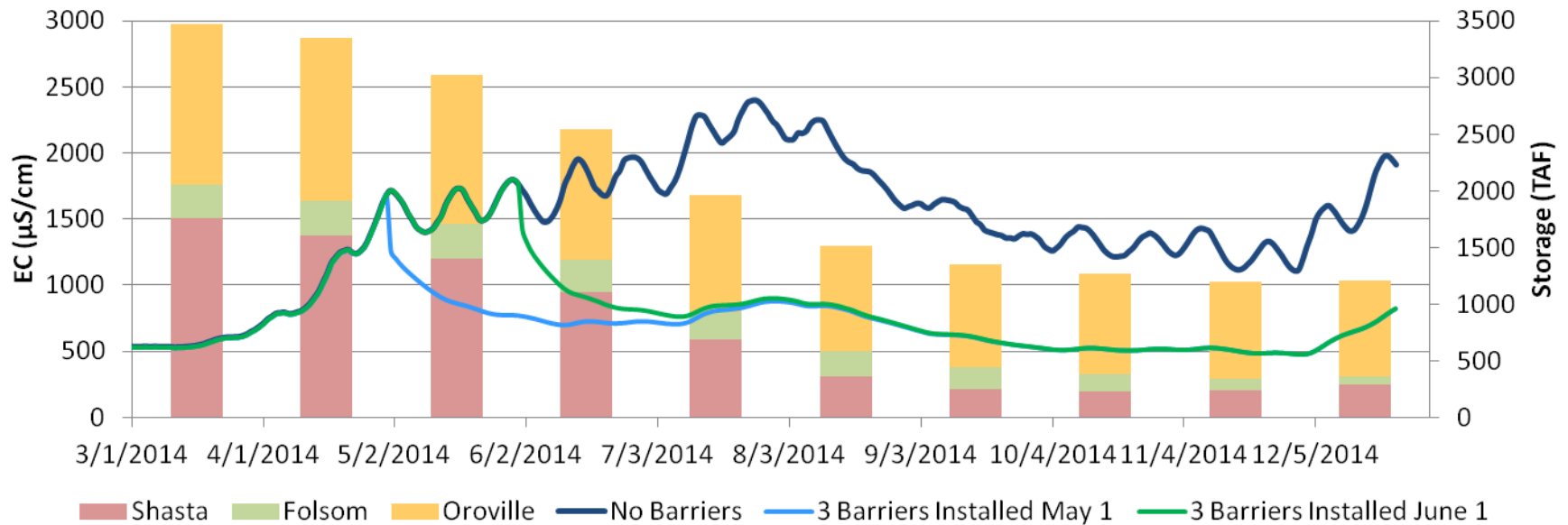
- Total Reservoir Capacity ~9,000 TAF



# Modeled Salinity Upstream of False River Barrier

with End of Month Reservoir Storage

Minimum Releases from Allocation Study with Delta Cross Channel Open in May and June



- Feb 20, 2014 forecast

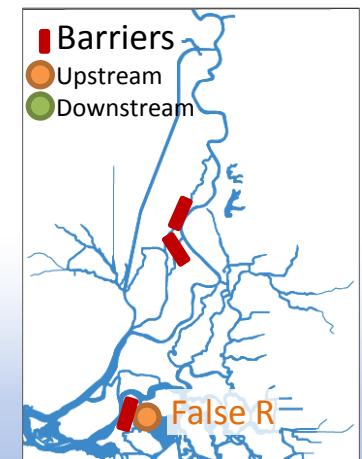
- Feb 20 Reservoir Conditions

- Shasta 1720 TAF 38% capacity
- Folsom 290 TAF 29% capacity
- Oroville 1385 TAF 39% capacity

- Mar 16 Reservoir Conditions

- Shasta 2050 TAF 45% capacity
- Folsom 400 TAF 41% capacity
- Oroville 1600 TAF 45% capacity

- Total Reservoir Capacity ~9,000 TAF





# Proposed Barrier Designs

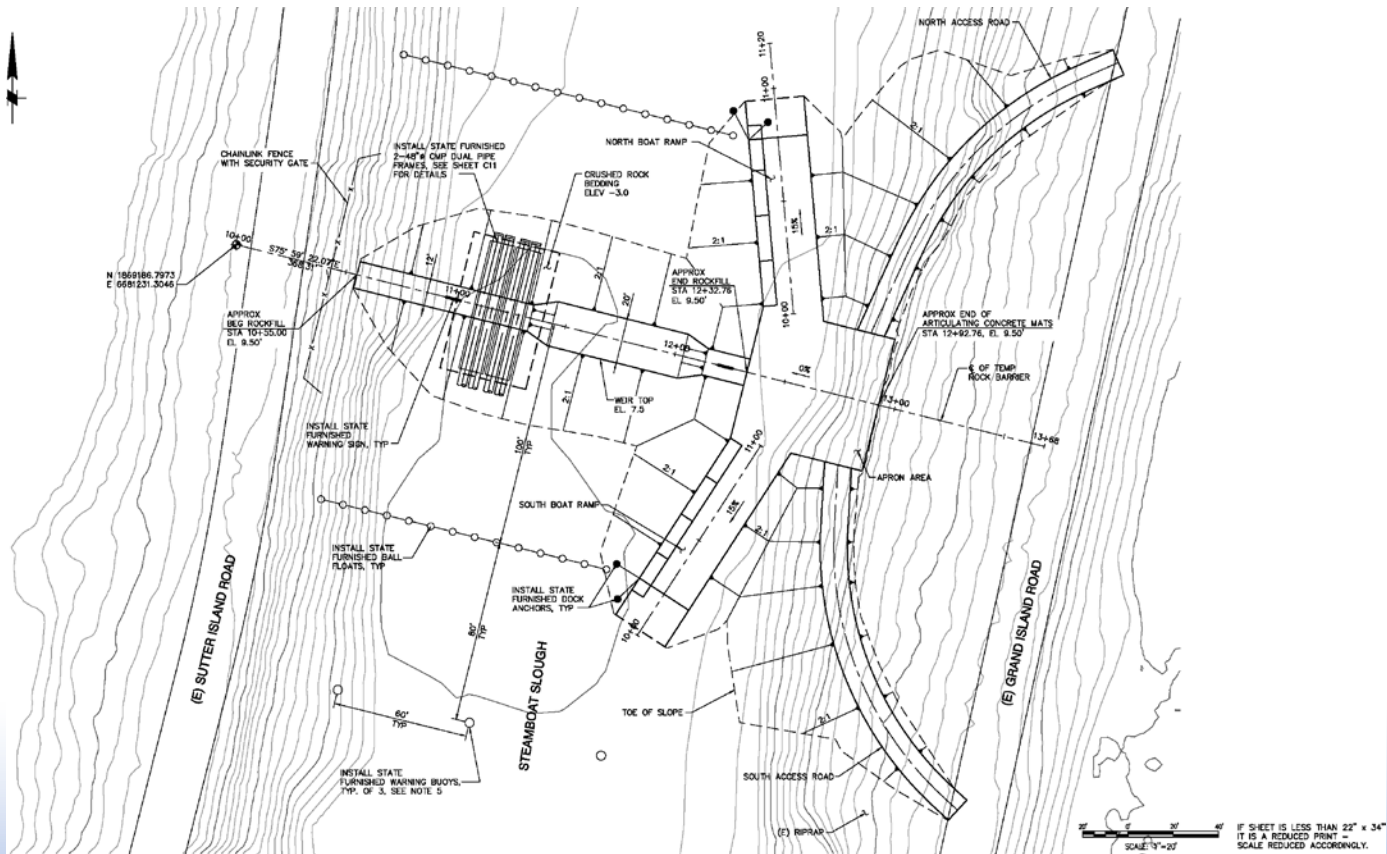


# Modernized Design of 2014 Barriers Provides Additional Benefits

- Operational Flexibility. Sutter and Steamboat Slough barriers are anticipated to have four 48” culverts to allow fish passage and downstream flow for water quality when beneficial.
- Steamboat Slough is anticipated to have a boat portage facility to allow passage for boats under 22 feet to cross the barrier.

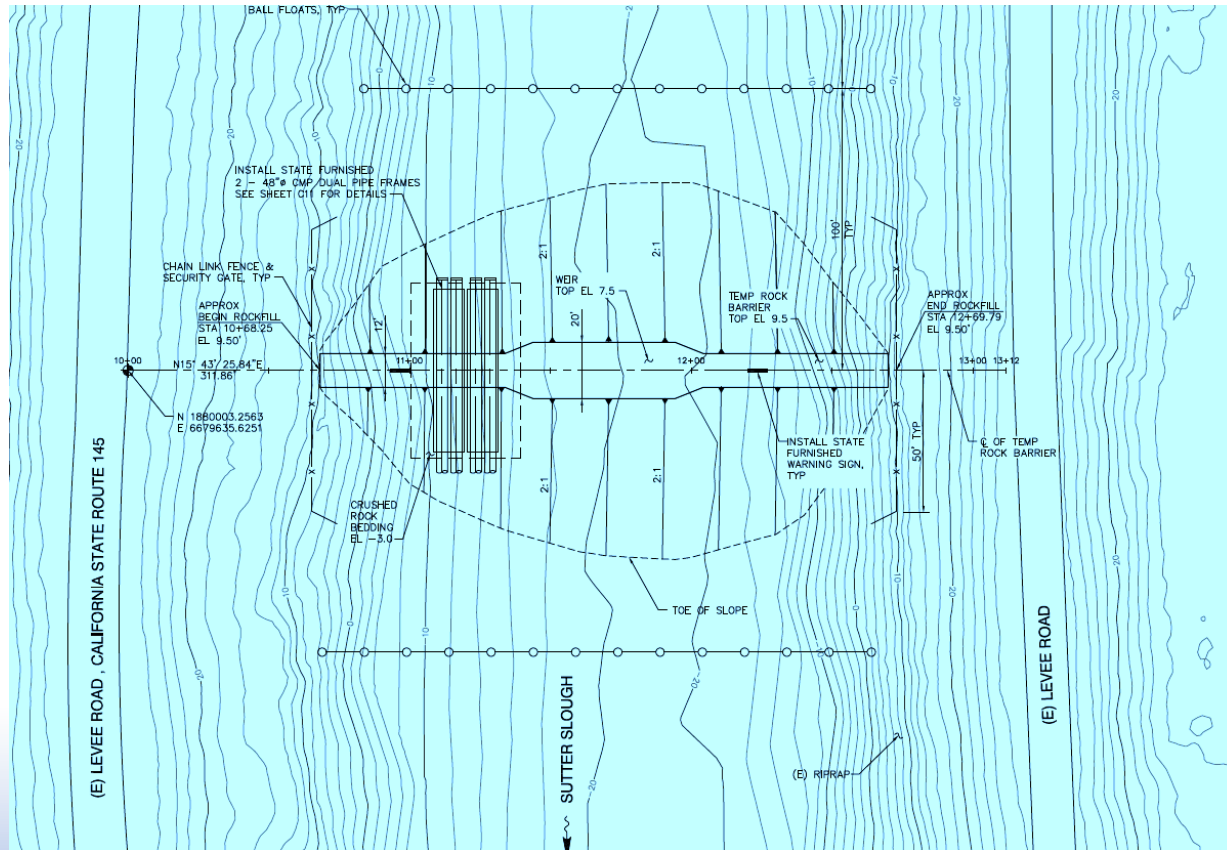


# Steamboat Slough Barrier Draft Design



# Sutter Slough Barrier

## Draft Design



# False River Barrier Draft Design

